

IN THE CLAIMS

Please ADD new claims 77-104, as follows. Note that all the claims currently pending in this application, including those not currently being amended, have been reproduced below for the Examiner's convenience.

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1-44. (Previously Cancelled)

C/ 45. (Previously Amended) An exposure apparatus comprising:

an illumination optical system for illuminating a mask with light from a light source;

a projection optical system for projecting a pattern of the mask being illuminated, said projection optical system having a plurality of optical elements; and

gas supplying means for locally supplying a gas to a predetermined surface of one of said optical elements, which is closest to an image plane, the predetermined surface being a surface facing the image plane, wherein said gas supplying means has a surface outlet port which is inclined with respect to the image plane so that the gas outlet port faces toward the predetermined surface of the one optical element rather than to the image plane.

46. (Previously Amended) An apparatus according to Claim 45, further comprising a container for accommodating the optical elements within a space being isolated from a surrounding ambience.

47. (Previously Amended) An apparatus according to Claim 46, further comprising a cover, disposed at the predetermined surface side of said container, for suppressing diffusion of the gas supplied by said gas supplying means to the one optical element.

48. (Previously Added) An apparatus according to Claim 47, wherein said gas supplying means includes a plurality of gas supplying ports provided inside said cover and disposed revolutionally symmetrically with respect to an optical axis of said projection optical system.

49. (Previously Added) An apparatus according to Claim 45, further comprising adjusting means for adjusting a gas supplying flow rate and a gas supplying pressure in accordance with the state of use of said exposure apparatus.

C 1  
50. (Previously Added) An apparatus according to Claim 45, further comprising temperature adjusting means for adjusting a temperature of the gas supplied from said gas supplying means.

51. (Previously Added) An apparatus according to Claim 50, wherein said gas supplying means includes a plurality of gas supplying ports provided inside said cover and disposed revolutionally symmetrically with respect to an optical axis of said projection optical system.

52. (Previously Added) A device manufacturing method, comprising the steps of:  
exposing a workpiece with a pattern by use of an exposure apparatus as recited in  
Claim 45; and  
developing the exposed workpiece.

53-76. (Previously Cancelled)

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77. (New) An optical apparatus comprising:  
an optical element; and  
means for producing a laminar flow of a gas, locally flowing to a surface of the  
optical element.

78. (New) An apparatus according to Claim 77, further comprising a light source for  
providing light having a wavelength in an ultraviolet region.

79. (New) An apparatus according to Claim 77, wherein said apparatus is to be used with  
light having a wavelength in an ultraviolet region, and wherein said apparatus further comprises  
(i) an ultraviolet optical system accommodated in a container, being isolated from a surrounding  
ambience, and (ii) gas supplying means provided outside an optical element which is disposed at  
one of an ultraviolet-ray entrance opening and an ultraviolet-ray exit opening of said container,  
said gas supplying means being arranged to produce a laminar gas flow, flowing to a surface of  
the optical element, thereby to locally supply a gas to the surface of the optical element.

80. (New) An apparatus according to Claim 77, further comprising (i) means for locally supplying a gas to the surface of the optical element, and (ii) gas discharging means for exhausting the gas supplied by said gas supplying means.

81. (New) An apparatus according to Claim 77, further comprising a plurality of gas supplying means each being arranged to produce a laminar gas flow, flowing to the surface of the optical element, thereby to locally supply a gas to the surface of the optical element, wherein said plurality of gas supplying means are disposed rotationally symmetrically with respect to an optical axis of the optical element.

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82. (New) An apparatus according to Claim 77, further comprising (i) a plurality of gas supplying means each being arranged to produce a laminar gas flow, flowing to the surface of the optical element, thereby to locally supply a gas to the surface of the optical element, and (ii) a plurality of gas discharging means for exhausting the gas supplied by said gas supplying means, wherein said plurality of gas supplying means are disposed rotationally symmetrically with respect to an optical axis of the optical element, and wherein said plurality of gas discharging means are disposed rotationally symmetrically with respect to the optical axis of the optical element.

83. (New) An apparatus according to Claim 80, wherein said gas supplying means is disposed at one side of a side face of the optical element, and wherein said gas discharging means is disposed at the other side of the optical element.

84. (New) An apparatus according to Claim 77, further comprising a cover member for reducing diffusion of the gas locally supplied to the surface of the optical element.

85. (New) An apparatus according to Claim 77, further comprising means for removing an impurity contained in the gas locally supplied to the surface of the optical element.

86. (New) An apparatus according to Claim 77, further comprising gas supplying means having means for removing an impurity contained in the gas.

87. (New) An apparatus according to Claim 77, wherein the gas is an inactive gas.

88. (New) An apparatus according to Claim 77, wherein the gas is an atmospheric gas, and wherein said apparatus further comprises means for removing an impurity contained in the gas.

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89. (New) An apparatus according to Claim 77, further comprising (i) gas supplying means and (ii) adjusting means for adjusting a gas supplying flow rate and a gas supplying pressure of said gas supplying means in accordance with the state of operation of said optical apparatus.

90. (New) An apparatus according to Claim 77, further comprising (i) gas discharging means and (ii) adjusting means for adjusting a gas exhausting flow rate and a gas exhausting

pressure of said gas discharging means in accordance with the state of operation of said optical apparatus.

91. (New) An apparatus according to Claim 77, further comprising (i) gas supplying means and (ii) a temperature adjusting means unit for the gas supplied or to be supplied by said gas supplying means.

92. (New) An apparatus according to Claim 77, wherein said optical apparatus is an exposure apparatus.

93. (New) An apparatus according to Claim 77, wherein said optical apparatus is an exposure apparatus, and wherein said exposure apparatus includes a projection optical system and gas supplying means provided in association with an optical element of said projection optical system, which optical element is disposed opposed to a wafer.

94. (New) A device manufacturing method, comprising the steps of:

exposing a workpiece by use of an optical apparatus as recited in Claim 92; and  
developing the exposed workpiece.

95. (New) A contamination preventing method for an optical apparatus, said method comprising:

producing a local laminar flow of a gas, flowing to a surface of an optical element of the optical apparatus, thereby to prevent contamination of the optical element.

96. (New) A method according to Claim 95, wherein the optical apparatus includes a light source of ultraviolet rays.

97. (New) A method according to Claim 96, wherein the optical apparatus to be used with the ultraviolet rays includes an optical system accommodated in a container and having an optical element disposed at one of an ultraviolet-ray entrance opening and an ultraviolet-ray exit opening of the container, and wherein a laminar gas flow, flowing to the surface of the optical element, which surface faces to a surrounding ambience, is produced thereby to locally supply a gas to the surface of the optical element and to prevent contamination of the optical element.

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98. (New) A method according to Claim 95, further comprising adjusting at least one of (i) a gas supplying flow rate and a gas supplying pressure of gas supplying means and (ii) a gas exhausting flow rate and a gas exhausting pressure of gas discharging means in accordance with the state of operation of the optical apparatus.

99. (New) A method according to Claim 95, further comprising removing an impurity contained in the gas by impurity removing means, and supplying the impurity-removed gas to the surface of the optical element.

100. (New) A method according to Claim 95, wherein the optical apparatus is an exposure apparatus.

101. (New) A method according to Claim 95, wherein the optical apparatus is an exposure apparatus having a projection optical system, and further comprising causing a laminar gas flow to locally flow to the surface of an optical element of the projection optical system, facing a wafer.

102. (New) An exposure method, comprising:

exposing a wafer with a pattern, while avoiding contamination of an optical element in accordance with a method as recited in Claim 95.

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103. (new) An exposure apparatus arranged to perform an exposure operation in accordance with an exposure method as recited in Claim 102.

104. (New) A device manufacturing method, comprising the steps of:

exposing a wafer in accordance with an exposure method as recited in Claim 102;

and

developing the exposed wafer.

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